IV SEM
Information Technology

Sr. No.	Course Code	Courses	L	T	P	Credits
1	IT3CO02	Data Structures	3	1	2	5
2	IT3CO04	Computer System Organization	3	1	0	4
3	IT3CO05	Database Management System	3	1	2	5
4	IT3CO08	Operating Systems	3	0	2	4
5	IT3CO18	Data Communication	3	0	0	3
6	EN3MC03	Technical Communication	2	0	0	0
7	IT3CO16	Computer Programming-III	2	0	2	3
		Total	**19**	**3**	**8**	**24**
		Total Contact Hours	**30**			

Course Code	Course Name	Hours per Week			Total
		L	T	P	Credits
IT3CO02	Data Structures	3	1	2	5

Unit I: Introduction, Definition, Terminology, Types of Data structure, Application of Data structure. Overview of array, one dimensional array and multidimensional array. Functions, Parameter Passing: Call by value, Call by reference, Pointers, Recursive functions.

Unit II : Concept of Linear and Non Linear, Static and Dynamic, Primitive and Non Primitive, Persistent and Non Persistent Data structure.Stack, Primitive Stack operations, Array Implementation of Stack, Multiple Stack, Application of stack: Prefix and Postfix Expressions, Evaluation of postfix expression, Recursion, Tower of Hanoi Problem, Simulating Recursion, Principles of recursion, Tail recursion, Removal of recursion

Unit III: Queue and Linked List,Overview of Queue,Operations on Queue, Circular Queues, Array implementation of Queues, Dequeue and Priority Queue, Concept of Linked List organization, Singly List, Doubly List, Circular list and doubly circular Linked List Operations: Linked list implementation of stack and queue, Applications of Linked List data structure.

Unit IV: Searching and Sorting.Sequential search, Binary Search, Internal and external Sort , Bubble Sort, Selection Sort, Insertion Sort, Shell Sort, Radix Sort, Quick Sort and Merge Sort. Hashing: Hash Function, Collision Resolution Strategies, Storage Management: Garbage Collection and Compaction.

Unit V: Trees and Graphs, Basic terminology, Binary Trees, Binary Tree Representation, Complete Binary Tree, Algebraic Expressions, Extended Binary Trees, Array and Linked Representation of Binary trees, Tree Traversal, Threaded Binary trees, AVL tree, Heaps.

Basic terminology and types of Graph, Representations of Graphs, Graph Traversal, Connected Component, Spanning Trees, Minimum Cost Spanning Trees, Shortest Path algorithm.

Text Books:

1. Alfred V. Aho, Jeffrey D. Ullman, John E. Hopcroft. Data Structures and Algorithms, Pearson.
2. Aaron M.Tenebaum, Yedidyah Langsam, Moshe J. Augenstein, Data Structures Using C, Pearson.
3. Seymour Lipschutz, Data Structures, Schaum's Outlines Series, TMH.

References:

1. E. Horowitz , Sartaj Sahani, Fundamentals of Data Structures, University Press.
2. Jean Paul Tremblay, P.G. Soreson, Data Structures, TMH Publications.
3. R. Venkatesan, S. Lovelyn Rose, Data Structures, Wiley India Pvt.Ltd.

NPTEL Reference:

1. http://nptel.ac.in/courses/106102064/
2. http://nptel.ac.in/courses/106106133/
3. http://nptel.ac.in/courses/106106127/

Tentative List of Programs:

1. Write the algorithm and program for matrix multiplication of n x n.
2. Write the algorithm and program to Copy Elements of Array in another Array.
3. Write the algorithm and program to insert, delete and search an element in an Array.
4. Write the algorithm and program using pointers to read in an array of integers and print its elements in reverse order.
5. Write the algorithm and program to implement Stack and perform PUSH and POP Operation.
6. Write the algorithm and program to reverse the string using stack.
7. Write the algorithm and program to implement circular queue through array.
8. Write the algorithm and program to insert and delete an element into the Queue.
9. Write the algorithm and program to implement Singly Linked List and Doubly Link List.
10. Write the algorithm and program to sort N numbers in ascending order using
    a. Bubble sort
    b. Insertion sort
    c. Selection sort
    d. Quick sort
    e. Merge sort
    f. Radix Sort
11. Write the algorithm for implementing trees and its operations.
12. Write the algorithm and program to represent graphs and its traversal.
13. Write the program to implement travelling salesperson problem.
14. Think of solving a 2x2x2 Rubik's Cube.
15. Make a list of cities close to Indore for a pilgrimage trip and assign the distances between the cities. Make a travel plan to cover these cities in minimum distance.
16. Make a study of keeping the library cards of issued books in the library. How do we define the data structure for it and its efficiency to find the card in minimum time.

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IT3CO04	Computer System Organization	3	1	0	4

Unit I Basic architecture and organization of computers, Von Neumann Model, Registers and storage, Register Transfer Language, Bus and Memory Transfer, Common Bus System, Machine instructions, functional units and execution of a program; instruction cycles, Instruction set architectures, instruction formats

Unit II Direct and Indirect Address, addressing modes; Arithmetic Logic Units control and data path, data path components, design of ALU and data path, Stack Organization, discussions about RISC versus CISC architectures, controller design; Hardwired and Microprogrammed Control

Unit III Information representation, Floating point representation (IEEE 754), computer arithmetic and their implementation; Fixed,Point Arithmetic: Addition, Subtraction, Multiplication and Division, Memory Technology, static and dynamic memory, Random Access and Serial Access Memories, Cache memory and Memory Hierarchy, Address Mapping, Cache updation schemes, Virtual memory and memory management unit.

Unit IV I/O subsystems: Input,Output devices such as Disk, CD,ROM, Printer etc.; Interfacing with IO devices, keyboard and display interfaces; Basic concepts Bus Control, Read Write operations, Programmed IO, Concept of handshaking, Polled and Interrupt driven I/O, DMA data transfer

Unit V Parallel Processing, Pipeline Processing, Instruction and Arithmetic Pipeline, Pipeline hazards and their resolution, Vector Processing – vector operations, memory interleaving, matrix multiplication, Supercomputers, Array Processors – attached and SIMD array processors

Text Book:

1. Morris Mano, Computer System Architecture, Prentice Hall of India.
2. William Stallings, Computer Organization and Architecture, Prentice Hall of India.
3. J.P. Hayes, Computer Architecture and Organization, McGraw Hill.

Reference Books:

1. V. Carl Hamacher, Safwat G. Zaky and Zvonko G. Vranesic , Computer Organization, McGraw Hill series.
2. David Patterson and John Hennessey, Computer Organization and Design, Elsevier.
3. Vincent P. Heuring and Harry F. Jordan, Computer Systems Design and Architecture, Prentice- Hall Inc.

Web Sources

NPTEL Reference:

1. http://nptel.ac.in/courses/106103068/
2. http://nptel.ac.in/courses/106106166/

Course Code	Course Name	Hours per Week			Total
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IT3CO05	Database Management System	3	1	2	5

Unit I: Basic Concepts: Overview about data, types of data, Data Vs Information, Definition of Database, Purpose of database systems, Components of DBMS, DBMS Architecture and Data Independence, Data modeling, Entity Relationship Model, Relational, Network, Hierarchical and Object Oriented models. Data Modeling using the Entity Relationship Model.

Unit II: Relational Database: Relational databases, relational algebra, relational algebra operation, tuple relational calculus, domain relational calculus.
Data definition with SQL, inserts, delete and update statements in SQL – views – data manipulation with SQL.

Unit III: Database Design: Design guidelines– Relational database design, Integrity Constraints, Domain Constraints, Referential integrity, Functional Dependency.
Normalization using Functional Dependencies: Normal forms, First, Second and Third Normal Forms. Boyce Codd Normal Form, Multivalued Dependencies and Forth Normal Form, Join Dependencies and Fifth Normal Form, Pitfalls in Relational Database Design.

Unit IV: Database Transactions: Introduction to Transaction Processing, Transaction and System Concepts, Desirable properties of Transactions, Schedules and Recoverability, Serializability of Schedules.

Unit V: Distributed Database: Distributed databases: Distributed Database Concepts, Data Fragmentation, Replication and Allocation Techniques, Different Types.

Text Books:

1. Ramez Elmasri and Shamkant B. Navathe, Fundamentals of Database System, Pearson Education Asia.
2. Henry F Korth, Abraham Silbershatz, Database System Concepts, Mc Graw Hill.

Reference Books:

1. C.J. Date, An Introduction to Database Systems, Pearson Education Asia.

NPTEL Reference:

1. http://nptel.ac.in/courses/106106095/
2. http://nptel.ac.in/courses/106106093/

Tentative List of Programs:

For each of the practical exercises you shall need to draw the schema of the database and then write its syntax in database tool you are using. The snapshots of tables have to be attached with the exercises.

1. ER diagram and schema definition for at least 5 projects.
2. Practice SQL DDL, DML and DCL Commands in any RDBMS Software.
3. Practice Relational Algebra Operation using SQL.
4. Demonstrate unique and referential integrity constraints using SQL.
5. Demonstrate Like predicate, Group By, Having Clause using SQL.
6. Demonstrate views and triggers using SQL.
7. Demonstrate PL/SQL block.
8. Create records of student in the class as personal and educational details and observe various queries on it.
9. Create and manage a school management system where you create the hierarchy in organization and facilitate record management in it.
10. Create and manage the records for a job facilitating agency.
11. Write a case study on latest database management open source tool available. The report must contain its features, its GUI and compatibility.

Course Code	Course Name	Hours per Week			Total
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IT3CO08	Operating Systems	3	0	2	4

Unit I: Introduction Language Processors, Language Processing Activities and Language Processors Development Tools, Assemblers, Compiler, Macros and Macro Processors, Linkers, Introduction to OS. Operating system functions, evaluation of O.S., Different types of O.S.: batch, multi-programmed, time-sharing, real-time, distributed, parallel.

Unit II: Process: Concept of processes, process scheduling, operations on processes, cooperating processes, inter- process communication. Precedence graphs, critical section problem, semaphores, Threads.
CPU scheduling: scheduling criteria, preemptive & non-preemptive scheduling, scheduling algorithms, algorithm evaluation, multi-processor scheduling. Deadlock: Deadlock problem, deadlock characterization, deadlock prevention, dead lock avoidance, deadlock detection, recovery from deadlock, Methods for deadlock handling

Unit III: Memory Management: Concepts of memory management, logical and physical address space, swapping, Fixed and DynamicPartitions, Best Fit, First Fit and Worst Fit Allocation, paging, segmentation, and paging combined with segmentation.

Unit IV: Concepts of virtual memory, Cache Memory Organization, demand paging, page replacement algorithms, allocation of frames, thrashing, demand segmentation, Role of Operating System inSecurity, Security Breaches, System Protection, and Password Managment.

Unit V: Disk scheduling, file concepts, File manager, File organization, access methods, allocation methods, free space managements, directory systems, file protection, file organization & accessmechanism, file sharing implement issue, File Management in Linux, introduction to distributed systems.

Text Books:

1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne Operating Systems Concepts, Wiley Publications.
2. Andrew S. Tanenbaum, Modern Operating Systems, Pearson Education Asia.

Reference Books:

1. Terrence Chan, UNIX System Programming Using C++, Prentice Hall India.
2. W. Richard Stevens, Advanced Programming in UNIX Environment, Pearson Education.
3. William Stallings, Operating Systems, Pearson Education Asia.

NPTEL Reference:

1. http://nptel.ac.in/courses/106108101/
2. http://nptel.ac.in/courses/106106144/

Tentative List of Programs:

1. Write a program to demonstrate system call or procedure.
2. Write a program to demonstrate process communications methods.
3. Write a program to demonstrate process synchronization methods.
4. Simulate all the CPU scheduling algorithms.
5. Write a program to demonstrate Deadlock detection and prevention methods.
6. Write a program to demonstrate disk scheduling algorithms.
7. Write a program to demonstrate paging and swapping techniques.
8. Write a program to demonstrate thread and multithread.
9. Case Study on Unix, Linux (any latest variant), Windows (latest version) which must essentially contain its features like scheduler, file management strategy, process and memory management techniques.
10. Study on Android and IOS with its features.

Course Code	Course Name	Hours per Week			Total
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IT3CO18	Data Communication	3	0	0	3

Unit I Communication model Simplex, half duplex and full duplex transmission. Time Domain and Frequency Domain concepts, Analog & Digital data and signals, Transmission Impairments, Attenuation, Delay distortion, Noise, Different types of noise Channel capacity, Shannon's Theorem, Transmission media, twisted pair, Coaxial cable, optical fiber.

Unit II Parallel and serial transmission, Synchronous and Asynchronous transmission. Sampling theorem , Encoding digital data into digital signal , NRZ, Biphase, Multilevel binary , Encoding digital data into analog signals , ASK, FSK, PSK.

Unit III Encoding analog data into digital signals , PCM, PM, DM , Encoding analog data into analog signals , AM, FM, PM. Multiplexing , TDM, FDM, WDM, Encoding techniques, . Spread spectrum,The concept of spread spectrum – frequency hopping spread spectrum (FHSS), direct sequence spread spectrum (DSSS), code division multiple access (CDMA).

Unit IV Switching techniques, Circuit, packet and hybrid switching, Types of error, single bit error, burst error, Vertical redundancy check (VRC), Longitudinal redundancy check (LRC), cyclic redundancy check (CRC), Error detection , parity check, Forward Error Correction. Block codes, Convolution codes.

Unit V Basic principles of switching , circuit switching, packet switching, message switching. Basics of wireless communication, Introduction to WiFi, WiMax, GSM, GPRS.

Text Books:

1. Behrouz A. Forouzan, Data Communication and Networking, Tata McGraw Hill.
2. Prakash C. Gupta, Data Communication and Computer Networks, PHI Learning.

Reference Books:

1. Andrew S. Tanenbaum, Computer Networks, PHI Learning.
2. Michael A. Gallo & William M. Hancock, Computer Communications & Networking Technologies, Cengage Pearsen Publications.
3. Youlu Zheng & Shakil Akhtar, Network for Computer Scientists & Engineers –Oxford Pub.

Course Code	Course Name	Hours per Week			Total
		L	T	P	Credits
IT3CO16	Computer Programming-III	2	0	2	3

Unit I Introduction to .NET framework, features of .Net framework, architecture and component of .Net framework , overview of CLR, class library, Data Types, Literals, and Variables, Operators, Program Control Statements. Basic Features of C#.
OOPs Concept: Classes and Objects, Inheritance and Polymorphism, Operator Overloading, Structures, Enumeration.

Unit II Advanced Features of C#: Interfaces, Arrays, Indexers and Collections, Generics, LINQ, Strings and Regular Expressions, Using I/O, Exceptions Handling, Delegates and Events, Multithreading.

Unit III Introduction to Windows Forms, System .Windows, Forms Control, User Defined Control, Understanding and handling controls events, WPF, Create Windows Application .

Unit IV ADO.NET, Component object model, ODBC, OLEDB, and SQL connected mode, disconnected mode, dataset, and data,reader. Data Base controls: Overview of data access data control, using grid view controls, using details view and frame view controls, ado .net data readers.

Unit V Introduction to ASP.NET framework, overview of ASP.net control, understanding HTML controls, study of standard controls, validations controls, rich controls.
Introduction of XML: XML, Structure and syntax of XML, document type definition (DTD), XML Schema, and Document object model

Text Books:

1. Herbert Schildt, C# 4.0 : The Complete Reference , McGraw Hill Publication.
2. Harvey Deitel, Paul Deitel, C# for Programmers, Pearson Education.
3. Elliotte Rusty Harold, XML Bible , Hungry Minds Inc.

Reference Books:

1. E. Balagurusamy, Programming in C#, TMH.
2. Daniel Minoli, Emma Minoli, Web Commerce Technology Handbook, TMH,
3. Chris Bates,Web Programming, Wiley Publication.

List of Practical /program:

A. **Console Application :**

1. Demonstrate with Data Types, Literals ,Variables and Operators
2. Demonstrate with Program Control Statements.
3. Demonstrate with **OOPs Concept:** Classes and Objects, Inheritance and Polymorphism, Operator Overloading, Constructor, Types of Constructor.
4. Demonstrate with Structures, Enumeration.
5. Demonstrate with Advanced Features of C#: Interfaces, Arrays, Indexers and Collections, Generics, LINQ,
6. Demonstrate with Strings and Regular Expressions,
7. Demonstrate with Using I/O, Exceptions Handling,
8. Demonstrate with Delegates and Events,
9. Demonstrate with Multithreading.

B. **Windows Application :**

1. Create an application for Calculator using windows forms.
2. Create an application of Array element search using windows forms.
3. Create an application of handling exceptions using windows forms.
4. Create an application to Perform String Manipulation with the String Builder and String Classes using windows forms.
5. Create an application for events handling using windows forms.
6. Create an application for any real world problem using windows forms.

C. **Web based Application :**

1. Creating Login Form with Authentication For User Login Using C#.
2. Using the System .Net Web Client to Retrieve or Upload Data with C# .
3. Reading and Writing XML Documents with the XML Text,Reader/,Writer Class and C#
4. Working with Page using ASP .Net.
5. Working with Forms using ASP .Net.
6. Data Sources access through ADO.Net.
7. Working with Data readers, Transactions.
8. Creating Web Application.

Course Code	Course Name	Hours per Week			Total
		L	T	P	Credits
EN3MC03	Technical Communication	2	0	0	0

Unit I Communication: Difference between general and Technical Communication, Barriers to Communication, Verbal/ Non Verbal Communication, Body language , flow, patterns, types of communication.

Unit II Confidence Building : Self evaluation and development, SWOT Analysis, overcoming hesitation and fear of facing public, exercisesforconfidence building, concepts and elements of emotional intelligence, significance.

Unit III Business Correspondence – Business letters, formats, parts and layouts of business letters. sales letters:job applications, resume writing,applications, calling quotations, sending quotation, placing orders, complaints, and aftermath. Email Etiquettes.

Unit IV Report Writing – Business letters, formats, parts and layouts of business letters. sales letters:job applications, resume writing,applications, calling quotations, sending quotation, placing orders, complaints, and aftermath. Email Etiquettes.

Unit V Formal Presentation- Organising data, assimilating, preparing slides, designing presentations, basic personality traits.Interviews, group discussion

Text Books:

1. R C Sharma, Krishna Mohan, Business Correspondance and Report Writing, Technical Communication.
2. M Ashraf Rizvi, Effective Technical Communication, McGraw Hill.

Reference Books:

1. Prof P N Kharu, Dr Varinder Gandhi, Communication Skills IN English, University Science Press.
2. Herta A Murphy, Effective Business Communication, McGraw Hill Education India.

Web Source:

http://study.com/academy/lession/communication-skills-definition-examples.html
https://books.google.co.in/books?

Open Learning Source:

https:/onlinecourses.nptel.ac.in